Big Picture Comments

General Comment No.	General Comment Subject	Big Picture Comment	Reviewer	Decision-Making Status[1]	Next Step[2]
		<u>Element</u> <u>Source (from draft FS or create)</u> Exposure units: New, but easy to create. RALs: Retain same RALs from FS. RALs are somewhat arbitrary sediment concentrations to define SMAs (except the lowest RAL = RG or background), and are not based on the exposure area. SMAs: Retain SMAs from FS, including acres of active remediation (retain this term for simplicity/consistency). The footprint of RAL concentrations (i.e., contours of sediment concentrations above a RAL) stay the same as the FS, since surface sediment concentrations have not changed. If EPA decides to redefine the dataset/cores included within "surface concentrations," then new slightly different SMAs need to be created. Exposure Unit RAL curves: New- this is where things start to change! Calculate new SWACs <u>within each exposure unit</u> for each RAL (repeat for other COCs). Our interpretation and application of these new curves at T=0 (upon completion of remedy implementation) affects remedy evaluation. For example, if we want a T=0 SWAC of 17 ppb total PCBs within an exposure unit, we may reject the first x alternatives that do not achieve this goal. Also, use a ranked plot of new PCB SWACs for each exposure unit to find the knee of the curve and help justify why these 6 sites (+Arkema and Gasco) are the worst that should be cleaned up first. Remedial Alternatives: Pretty similar, since we're using the same RALs and SMAs- consider dropping the i and r sub-alternatives and just simply define active remediation within the SMAs as x% dredging and y% capping, etc. Use existing unit info in FS to recalculate volumes and costs as appropriate, and consider changing some of the "rules" for dredging, capping, etc. This is a broad, 30,000-foot view, and of course we could make lots more modifications from the draft FS which may make our departure from the draft FS more challenging to create and explain. My point is that at least some of the draft FS structure/presentation could be retained and used in the proposed plan.	Gainer, DEQ		
	Overall Assessment	Overall, the FS provides a sound technical evaluation that is sufficient to support EPA's remedial action decision. The areas identified for remediation using the selected RALs are sufficient to address the majority of the areas that pose a risk to human health and the environment. Despite a bias towards monitored natural recovery, a determination that the various alternatives are equally protective and that remedial alternatives that remove more material or are longer in duration are less effective, much of the analysis presented in the report is sound. By supplementing the FS evaluation with its own evaluation, EPA should be able to move into the proposed plan without major revision of the draft FS.	Blischke, CDM Smith	Acceptable	
	Overall Assessment	Two approaches that I think were useful in developing the FS were: -focus on refined list of PRGs. -use of RALs to define remediation areas on the basis of wider exposure areas.	Gustavson, Corps	Acceptable	
	Overall Assessment	**Adequate and Appropriate Evaluations** The FS includes a number of sections that provide useful information that may allow the remedial process to move forward without major new efforts.	Wagoner /Dexter, Ridolfi	Acceptable	

[1] Acceptable = Generally acceptable for decision making.
Potentially Acceptable = Some of the data and/or evaluation is acceptable for decision making; additional/different evaluation is recommended (identify Next Steps)
Unacceptable = Not useful for decision making
[2] Next Steps: Identify responsible parties for next step – may include EPA Action, LWG Action, or Other

		• The technical and cost evaluations for the different remedial technologies that make up the core approaches were reasonably well done and applicable to the site, even if the specific suggestions for their use in the FS may not appropriate. • The mapping the locations and extent of the concentrations in the sediments of key COPCs that exceed preliminary remedial action limits (RALs) is useful in providing a preliminary identification of the sediment management areas (SMAs.) The most appropriate boundaries of those sites, e.g., based on differing remedial action levels (RALs), was not established. • The FS analyzes the sediment contamination data in ways that are useful for prioritizing the effectiveness of remediating the SMAs in reducing risks, based on the concentrations and estimated volumes of contaminated sediments present in the different SMAs.			
	FS Database	**Acceptable, update**. The FS database is reasonable to use as the basis of evaluations. However, more recent data from early actions should be incorporated into the dataset for the draft FS. The database for the Fate and Transport model was limited to data added as of September 10, 2009 and should be updated with all available data (see FS Section 2.8).	J Peers, Stratus	Acceptable	
	Conceptual site model	**Acceptable, use with caution.** The conceptual site model is generally appropriate and the main conclusions are reasonable. However, we have some concerns with the mass balance inputs and outputs (Figure 2.5-1) based on the Fate and Transport model. Thus we recommend that the mass balance information be used as informative but not quantitative.	J Peers, Stratus	Acceptable	
	Remedial action objectives (RAOs) and remedial goals (RGs)	**Acceptable** We assume that this element was presented as requested by EPA and is therefore acceptable.	J Peers, Stratus	Acceptable	
	RAOs and RGs	We recommend disregarding the subjective “RG sensitivities and uncertainties” analysis presented in Section 3.6.	J Peers, Stratus	Unaccepta ble	
	Applicable or Relevant and Appropriate Requirements (ARARs)	**Acceptable** We assume that this element was presented as requested by EPA and is therefore acceptable.	J Peers, Stratus	Acceptable	
	RGs	**Acceptable** We assume that this element was presented as requested by EPA and is therefore acceptable.	J Peers, Stratus	Acceptable	
	Remedial action levels (RALs)	**Acceptable** We assume that this element was presented as requested by EPA and is therefore acceptable.	J Peers, Stratus	Acceptable	
	MNR	Reliance on uncertain (and seemingly excessive) MNR processes to achieve protectiveness [Earl]	Gustavson, Corps	Potentially Acceptable	
	MNR	**Unacceptable, needs additional work** The effectiveness of MNR was evaluated by empirical lines of evidence and predictive modeling. We are concerned that the effectiveness of MNR is not adequately evaluated and warrants further empirical sampling. Many of the empirical lines of evidence are overly generalized and may not hold true on smaller scales. For example, net sedimentation rates are used to indicate that the study area is depositional on average and in most areas. Similarly, lateral averaging of the net sedimentation rates (Figure 6.2-4) is inappropriate and not meaningful. The sediment cores collected from quiescent areas show no trends that would support a pattern of regular deposition. Additionally, there are areas of the harbor that do not exhibit net deposition over the 7-year period examined (see Figure 6.2-15). Even areas with net deposition over the 7-year period may experience shorter periods of net erosion, which could expose contaminated sediments. MNR is also unlikely to be effective for some contaminants. As noted in the FS (footnote 4, p. 6-14), incoming sediments have concentrations of dichlorodiphenyldichloroethylene (DDE) that are similar to average surface sediment concentrations. Therefore MNR is unlikely to be effective for DDE outside of the areas with high DDE concentrations. The evaluation of temporal trends in surface sediment is inconclusive and not a strong line of evidence in support of MNR. The data were not collected in a manner appropriate for temporal trend analysis, and are highly variable, resulting in no significant trends. The weight-of-evidence approach in support of MNR considers surface-to-subsurface concentration ratios of PCBs. A large portion of the site	J Peers, Stratus	Potentially Acceptable	

		includes areas that have higher surface PCB concentrations than subsurface PCB concentrations, suggesting that MNR would not be effective in many areas. This line of evidence only considers PCBs, but other contaminants should also be considered when evaluating the effectiveness of MNR. The weight-of-evidence approach in support of MNR also relies on predictive modeling from the sediment transport model. We have expressed concerns with this model elsewhere in our FS comment memorandum, and are concerned that it is overly optimistic in its predictions of sedimentation rates. Figure 6.2-21 presents the results of the MNR lines of evidence in three categories: "areas expected to recover, areas where recovery is less certain, and areas where recovery is uncertain." The lines of evidence appear somewhat inconsistent with each other. Of particular concern is that the surface-to-subsurface concentration ratios are not consistent with the net sedimentation rate and grain size lines of evidence, suggesting that net sedimentation is not correlated with lower surface sediment concentrations. We recommend disregarding this summary evaluation.			
	MNR	Predictions in the draft FS are for successful monitored natural recovery throughout most of the Portland Harbor Superfund Site (hereafter referred to as "the Site"). The LWG has stated that multiple lines of evidence point to the validity of MNR for the vast majority of the Site, but they are apparently unable to explain why high levels of surface contamination remain in many areas where releases occurred decades ago. Any model that cannot account for this should not be used for natural recovery predictions on this scale and with this level of importance for the selection of a clean-up alternative. The whole conceptual site model relies heavily on uncertain levels of natural recovery. In addition, in describing the process options and analyzing the alternatives, there is no reason to lump enhanced MNR (EMNR) and in situ treatment (meaning carbon amendment) together, as these methods can and likely will be done independently of each other.	Neely, NOAA	Potentially Acceptable	
	MNR	Evaluation of MNR: The MNR evaluation should rely more strongly on the empirical lines of evidence and acknowledge the uncertainty in the output from the fate and transport model. Due to the uncertainty in long-term estimates and small scale variability in the empirical MNR evaluation, the FS should rely primarily on the remedial outcomes immediately following construction. Due to the importance of the MNR evaluation, EPA should perform independent analysis of empirical results such as surface to subsurface sediment concentrations on a point by point basis and the evaluation of long term contaminant concentration trends. Because MNR will be a component of whatever remedy is selected, the empirical and modeled results can be used to support the protectiveness determination and the use of an adaptive management approach to ensure that the remedy is functioning as intended. The draft FS appears to overstate the effectiveness of MNR. EPA should work with Earl Hayter to understand the uncertainty and small scale variability in the model outcomes and any other model issues to ensure that MNR is properly considered in the draft FS.	Blischke, CDM Smith	Potentially Acceptable	
	MNR/Fate and Transport Dexter/Modeling	**Sediment Transport Model and Natural Recovery Predictions** The evaluation of the effectiveness of the remedial alternatives is based in large part on the results of the fate and transport model. The model simulates the erosion, transport, and deposition of sediment-associated contaminants within the study area. The model predicts that many portions of the study area are depositional such that given enough time, the risk to benthic receptors, and thus fish and people will decline as relatively less contaminated sediment from upstream of the site buries more contaminated sediment. While this process is likely to occur, there is substantial uncertainty in the predictions regarding where and at what rate. Among the major issues, the predicted sedimentation seems to be much greater than is consistent with the observed data. The model predicts such high rates of deposition in most areas that it supports the conclusion that all of the alternatives, including no action, are similarly effective, which supports LWG's preference for less aggressive alternatives. The model is still being vetted by EPA, and the model may be further adjusted and calibrated/verified, to yield different results with less deposition. Given the present uncertainties, the most protective approach is to assume that there is no deposition of clean sediment. I***n any case, we recommend not accepting the current sediment transport modeling or the associated predictions of the effectiveness of the alternatives.***	Wagoner/ Dexter, Ridolfi	Potentially Acceptable	
	Fate and transport modeling	**Unacceptable presentation/interpretation of results.** We have significant concerns about the fate and transport modeling used to evaluate the long-term effectiveness of the alternatives. Our main concerns, described here, are based on a review of the draft FS text. We have not conducted an evaluation of the model itself, as we understand that the Army Corps of Engineers is conducting that level of evaluation. Our first major concern has to do with the scale at which model results are presented. Model results are averaged across the channel and across RMs, and in some cases, across the entire site (~ 10 miles). In contrast, areas of contaminated sediment are generally within a localized area in a specific SMA or hot spot, typically near a river bank. The use of averaged results makes it very difficult to evaluate the predicted changes in chemical of concern (COC) concentrations in localized areas in response to remedial actions. The model results should present localized changes in COC concentrations for smaller, relevant areas, such as hot spots and SMAs, such that changes in risk can be evaluated. Our second major concern is that the model is not transparent. Appendix Ha states that "since its development, the QEAFATE code has been continually improved and updated by Anchor QEA (formerly QEC) personnel" (Appendix Ha, p. 17). Although this code is based on a public domain code (WASTOX, which also formed the basis for the EPA-supported model WASP), QEAFATE is not maintained by a public agency. It is not open	J Peers, Stratus	Potentially Acceptable	

		source or available in the public domain. As such, it is less "transparent" than a public domain code supported and maintained by a public agency such as the EPA or the U.S. Geological Survey. Appendix Ha does not describe how this code has been modified and maintained by Anchor QEA, or how changes to the code have been verified. This lack of transparency reduces confidence in the code. Appropriate references describing code modifications, testing, and maintenance should be provided. Our third major concern is how the model is used to support MNR as a remedial technology. For most of the COCs that are not expected to degrade in the environment, MNR depends on the simulated deposition of less contaminated sediments over more contaminated sediments. MNR thus requires areas to be depositional, and upstream sediments to be less contaminated than site sediments. Issues related to the simulation of sediment deposition and erosion are described in the sediment transport modeling comments below. For some contaminants, upstream sediment concentrations indicate that MNR is unlikely to be effective. For example, Figure 6.2-7 demonstrates that incoming sediments have concentrations of DDE that are similar to average surface sediment concentrations. Our fourth major concern is that the model appears to use unrealistic assumptions that are not representative of site conditions. It was used to estimate natural recovery rates using a tracer. The FS states, "This sediment transport modeling was conducted as a "bed tracer" simulation, in which a unit concentration (of 100) was specified throughout the sediment bed (i.e., laterally and vertically uniform) at the beginning of the simulation, and incoming particles from upstream were assigned a concentration of zero" (FS, p. 6-26). Figures 6.2-20a–d provide half-lives ranging from 5 to 49 years, apparently representing the time when the sediment concentration is half of the initial concentration. In reality, for all COCs, the upstream concentration is far above zero. For example, the mass balance analysis for the model indicates that 50% of the upstream load for PCBs and 90% of the DDE load enter from upstream (App. Ha, p. 59). Upstream DDE sediment concentrations are similar to observed surface sediment concentrations (Figure 6.2-7). The assumption of zero for upstream concentrations results in half-life calculations that significantly underestimate the time for concentrations to drop to 50% of current concentrations, thus underestimating the time for recovery. The half-lives calculated from this analysis are not representative of site conditions.			
	Sediment transport modeling	**Unacceptable presentation/interpretation of results.** We have significant concerns about the sediment transport modeling used to support the evaluation of alternatives. Our main concerns, described here, are based on a review of the draft FS text. We have not conducted an evaluation of the model itself, as we understand that the Army Corps of Engineers is conducting that level of evaluation. Although the scale of the evaluation is appropriate, the presentation of results is summarized over the entire study area. The modeling concludes that the harbor is "net depositional" (Appendix La, p. 50) based on averages for the site as a whole. However, the spatial and temporal patterns of erosion and deposition in localized hot spots and SMAs are critical to predicting sediment COC concentrations. Monitoring of sediment from 2003 to 2009 (Figure 6.2-1) indicates that many of the highly contaminated areas, including along the banks, are net erosional. The model relies on selected data on bed elevation change, and inappropriately excludes a portion of the available information. Although bed elevation change data are available from 2002 to 2009, the data from January 2002 to May 2003 were considered "anomalous." This was because although the incoming sediment load was similar to that of other years, bed elevation change data indicated that this timeframe was net erosional (Appendix La, p. 39). The model was only calibrated to data from May 2003 to January 2009, excluding data from the erosional time period. Exclusion of these data may result in the model underestimating the erosion rates and over-predicting deposition. Furthermore, the calibrated model under-predicted the extent of erosion from 2003 to 2009 – 12% versus 17% for predicted and observed, respectively (Appendix La, Figure 2-68). Figures that show how the model predicted and observed bed elevation changes "disagree" or "agree" (Figures 2-76 to 2-79) should focus on SMAs or smaller areas with high contaminant concentrations. The nature of the disagreement in contaminated areas is critical. If the model is predicting deposition in an area with high COC concentrations where erosion has been observed, this undercuts the reliability of the model for evaluating MNR and the effectiveness of remedial actions. Because output from the hydrodynamic model feeds into the sediment transport model but the sediment transport model does not feed back into the hydrodynamic model (Appendix La, p. 9), any substantial changes to the bathymetry over time will not be reflected in the hydrodynamic model. The text states that "successful calibration and validation of the model indicate that this limitation in the modeling framework does not have a significant effect on the predictive capabilities of the sediment transport model in the Lower Willamette River" (Appendix La, p. 9). The calibration of the model to 2003–2009 data does not prove that the one-way simulation has no effect on its predictive capabilities. This assumption should be justified in much more detail. The sensitivity of the hydrodynamic model could be evaluated by importing the simulated, altered bathymetry into the hydrodynamic model and running it.	J Peers, Stratus	Potentially Acceptable	
	Remedial technologies – dredging	**Generally acceptable, may need some rethinking.** In general, the evaluation of removal is appropriate. However, we disagree with the sub-SMA limitations in Section 6.2.7.2.1 in that structures should be evaluated for the potential for removal or	J Peers, Stratus	Potentially Acceptable	

		replacement, rather than simply assuming that removal is infeasible in their vicinity. The Lower Williamette Group bases this assumption on the costs of removal and replacement of structures, which is more appropriately addressed under costs. Additionally, Section 6.2.7.3 on Best Management Practices (BMPs) inappropriately disregards some technologies. Silt curtains and rigid containment should continue to be considered as BMPs in areas where they may be effective, particularly as controls on suspended sediment.			
	Dredging	The LWG applies numerous assumptions regarding the use of remedial dredging actions that introduce biases against dredging alternatives. These biases tend to portray the more dredging-intensive alternatives as far less desirable than actually may be the case. • For example, the draft FS assumes that no in-water remedial actions can occur outside of the in-water work window. However, this is not necessarily the case. NOAA would support such actions so long as isolation management measures could be implemented in the work area to prevent or substantially reduce salmonid exposures to contaminants. • The draft FS apparently also assumes that dredging technologies would be limited to mechanical dredges, though other dredge technologies could also be utilized where appropriate. For example, in some areas of the Site, hydraulic dredging would be faster and result in fewer and/or reduced contaminant releases. • The draft FS also relies on the assumption that dredging operations would be limited to reliance on three simultaneously operating dredge plants, an assumption that seems arbitrary and overly conservative. • Finally, the sequencing of the dredging in the draft FS alternatives does not seem logical in some cases: some of the graphs do not depict large reductions in contaminant levels until many years after remediation begins. NOAA maintains that areas with higher contamination should be removed first to achieve such early reductions. Taken cumulatively, these assumptions unrealistically increase the duration of many Site remedial alternatives, in particular those that rely more heavily on dredging actions. NOAA believes that a recalibration of these assumptions would introduce reasonable, cost-effective and practicable alternatives that would allow for the removal of larger volumes of more contaminated sediments, thereby producing more substantial reductions in ecological (and human health) risks.	Neely, NOAA	Potentially Acceptable	
	Dredging	Evaluation of Dredging – Releases, duration and controls. The evaluation of dredging in the FS over emphasizes the short term impacts of dredging based remedies, underestimates the effectiveness and implementability of sheet pile enclosures and over estimates the length of time that dredging would be required. The Diamond Alkali Removal action on the Passaic River is utilizing sheet pile controls. The Fox River dredging project is removing material at a rate of 30K cy/week. In addition, cleanup activities at OU-1 of the Fox River site have resulted in rapid declines in fish tissue levels. The EPA project team should perform an independent analysis of dredging to ensure that alternatives involving removal of contamination material are evaluated objectively.	Blischke, CDM Smith	Potentially Acceptable	
	Dredging	The use of engineering controls to lessen releases from dredging should not be screened out, rather employed judiciously in areas of high contaminant concentrations in condusive environments [Paul Schroeder].	Gustavson, Corps	Potentially Acceptable	
	Dredging/Containment Measures	The LWG claims in the draft FS that contaminant containment measures such as silt curtains or sheet pile walls are unsuccessful because a small amount of contamination still escapes when such methods are utilized. However, contaminants were successfully contained during the removal action at Gasco several years ago. (NOAA provides additional comments on containment measures on pages 7-8 of this correspondence.)	Neely, NOAA	Potentially Acceptable	
	Dredging – structures/ Sub-SMAs	**Acceptable, review structures for potential for removal** We agree that information about uses is useful for determining the feasibility of remedial technologies. However, we disagree that all structures affect implementability of dredging. A review of structures should be conducted to see which are potentially removable or replaceable.	J Peers, Stratus	Potentially Acceptable	
	Dredging	Release predictions are excessive: An estimate of 3% release of material at 100% soluble is excessive. [Paul Schroeder]	Gustavson, Corps	Potentially Acceptable	
	Dredging - Technology assignments	**Generally acceptable, may need some rethinking.** The technologies used are reasonable and appropriate for this site. However, we recommend that hydraulic dredging also be considered as an alternative to mechanical dredging in some areas. Additionally, we believe that the assignment of a technology should be based not only on the information about site characteristics that informs feasibility (defined as sub-SMAs in the FS), but also on the degree of contamination and the observed and predicted nature of erosion and deposition.	J Peers, Stratus	Potentially Acceptable	
	Dredge volume determination	**Generally acceptable, adjust as necessary.** The approach for dredge volume determination is generally appropriate. The determination may need to be adjusted if changes are made that affect the SMA footprints.	J Peers, Stratus	Potentially Acceptable	
	Construction sequencing	**Unacceptable, use base information and rethink.** The construction sequencing is inappropriate in that it does not address the most contaminated areas first. The durations of construction are also	J Peers, Stratus	Potentially Acceptable	

	and durations	inappropriately constrained. We recommend using the available information in the FS to design an appropriate sequencing for each alternative that addresses the areas posing the highest risk first, and maximizes efficiencies to complete the remedy in the shortest reasonable timeframe.			
	Construction sequencing and durations	**Remedy Duration** The FS assumes that the extensive dredging inherent in the more aggressive remedies, such as Alternative F, will take up to 28 years to implement. The length of this remedial schedule is likely to make this alternative seem untenable to the public and others. The schedule is driven by assumptions of construction rates and the fish window such that the amount of work that can be completed in a calendar year is quite limited. The difficulties with these estimates are further compounded because the FS takes the approach that sites need to be remediated starting with the upriver sites and moving consecutively downstream upon completion of the completion of the upstream site. This scheduling means that many highly contaminated areas would not be remediated for years. **We recommend using higher estimates of production rates and longer work windows, based on the assumption that the Services will allow work to proceed more rapidly to achieve the benefit of removing contaminants from the river.**	Wagoner/ Dexter, Ridolfi	Potentially Acceptable	
	Site-wide evaluation vs relevant exposure areas	**Excessive framing and focus on site-wide phenomena.** There is an excessive focus on sitewide phenomena such as deposition and contamination. Actions will not occur sitewide, contaminant sources and types are not homogeneous sitewide, and most exposures are not sitewide, yet the FS frequently focuses analyses and presents conclusions at the sitewide scale. For example, "the site is depositional" is frequently repeated. That assertion is not relevant or helpful to management at individual areas, where management will occur. Sitewide evaluations of cleanup approaches combine large expanses of clean areas with relatively contaminated areas into evaluations that establish remediation areas. Aggregating to those exposure areas (i.e., sitewide, segment-wide, or to the river mile) is not environmentally or biologically relevant and effectively dilutes the appearance of risk and unacceptable exposures. The FS analyses should focus on contaminated areas and exposure areas where exposures require management, not sitewide. Sitewide evaluations are useful as a secondary depiction; perhaps as a series of figures buried in an appendix, but they are generally not useful for describing impacts and effectiveness at relevant spatial scales of concern, or environmental phenomena such as deposition.	Gustavson, Corps	Potentially Acceptable	
	Site Wide Avg Concentration (SWACs)	On the use of site-wide SWACs to claim that all alternatives are equally protective: it is explicitly evident that exposure scenarios exist at spatial extents that are smaller – in some cases significantly smaller – than the entire study area. Therefore NOAA disagrees with the LWG's claim that all alternatives (B-F) meet the Environmental Protection Agency's (EPA) criteria, because site-wide SWACs are not appropriate cleanup criteria at this site. In addition, the use of SWACs to achieve remedial goals allows substantial spatial areas with higher and potentially problematic levels of contamination to be masked by areas with lower contamination, the latter constituting a relatively extensive portion of the study area. Risk calculations are conducted on a river mile SWAC basis. The data should not be averaged over an entire river mile: because the navigation channel effectively divides the 2 sides of the river into separate habitats, these should be assessed separately. So there should be at least three assessment areas per river mile: the left bank, the right bank, and the deep navigation channel. With respect to ESA-listed salmonids that utilize the Site, NOAA encourages EPA to ensure that remedial actions achieve reductions in contaminant concentrations on a suitable and appropriate spatial scale. NOAA anticipates that the draft *Regional Sediment Evaluation Framework* (2009), an interagency agreement currently under review, will provide screening levels for many of the contaminants in Portland Harbor that are protective of ESA listed salmonids We are hopeful that this information, when it becomes available, will be useful to EPA and its partners for remedial decision making purposes.	Neely, NOAA	Potentially Acceptable	
	SWAC	**Site Wide Average Concentrations** The FS uses site-wide average concentrations (SWACs) as a primary measure of remedy effectiveness. For any given chemical, the average concentration is calculated over the entire 11-mile study area. This approach lumps together high concentration data from known nearshore areas with lower concentration data from those areas between source areas as well as data from the navigation channel. Using a SWAC makes the site look more acceptable under existing conditions and downplays the risk reduction associated with cleaning up even the most contaminated areas. Additionally, the SWAC obscures the importance of cleanup in moderately contaminated areas. **Alternatively, we recommend calculating risk reduction independently for each side of the river, using sliding average concentrations to determine the extent each of the sediment management areas (SMAs) that exceeds applicable risk thresholds.**	Wagoner/ Dexter, Ridolfi	Potentially Acceptable	
	Evaluation of buried contamination	**Unacceptable, needs additional work** We find the evaluation of buried contamination to be flawed in that it does not provide sufficient information to make informed decisions about remediation. The hydrodynamic and sediment transport model is used to predict the potential for erosion of bedded sediments, and it concludes that this is not a concern (see Section 5.6.1). As expressed elsewhere in this memorandum, we have concerns about conclusions drawn from the models at this time. Additionally, the potential for exposure of buried contamination from dredging was only evaluated in designated future dredge areas (see Section 5.6.4) and the navigation channel (see Section 5.6.5). There is no analysis presented of where buried contamination exists outside of these areas, and therefore no clearly presented way to determine which buried contamination should be of concern.	J Peers, Stratus	Potentially Acceptable	

		We request that an analysis be done that looks at buried contamination throughout the study area. Using that information, reasonable decisions can then be made about the potential risks of leaving that contamination in place.			
	Evaluation of buried contamination	**Exposure of subsurface contamination.** "Expected changes in surface sediment concentrations due to river current erosion are relatively small and short in duration and, under the no action alternative, do not substantially alter the course of natural recovery as generally observed at the Site. There does not appear to be a need to identify any new areas of currently buried contamination that would have substantial impact on surface sediment concentrations. The extent to which any such erosion is expected to occur is fully integrated into and accounted for in the long-term surface sediment modeling results presented in Sections 6 and 8. Therefore, the importance, or lack thereof, of this process in terms of remedy success can be fully assessed via evaluation of the model results." Subsurface contamination requires serious consideration to evaluate its potential to pose unacceptable risk in the future and ultimately to determine cleanup areas and remedial technologies. Analysis of the extent and magnitude of potential exposures to these materials should not be relegated "fully" to and then dismissed by the sediment modeling (particularly modeling approaches that do not account for the impact of bed morphology changes on deposition rates over time). At a minimum, exposed concentrations immediately following the 100 yr event should be depicted; to bracket these results, the 100 year event should also be run at yr 0 and results presented.	Gustavson, Corps	Potentially Acceptable	
	Buried contamination	Perhaps subsurface contamination should be reevaluated during detailed evaluation of area-specific alternatives.	Blischke, CDM Smith	Potentially Acceptable	
	SMAs	**Potentially acceptable, use with caution, possibly request or develop additional maps** The SMAs, which are based primarily on the FS dataset and the RALs, seem to be generally appropriate. However, we have some concerns about assumptions made in the interpolation, particularly in areas with low data density (see Section 5.3.3). For each contaminant, a buffer distance was developed from the average distance between sample points; the buffer was used to mask out any areas with interpolated concentrations above RALs that are beyond the buffer distance from any point. This may result in inaccurate acreages and estimates of volumes, particularly in river miles (RMs) 6–8, and the implications of this assumption should be reviewed carefully. We would prefer to see additional samples in areas of uncertainty on the margins of SMAs. Additionally, it appears that the maps do not include all areas that exceed the RALs. The FS does not include areas where the average concentrations do not pose potentially unacceptable risks from benzo(a)pyrene, even if some areas do exceed the RALs (such as Swan Island Lagoon; see p. 5-4). The FS also does not include areas with benzo(a)pyrene and polychlorinated biphenyl (PCB) concentrations greater than the RALs outside of the areas of potential concern (AOPC) boundaries (see p. 5-8). There is no explanation of how many areas were removed, where they were, or what the nature of exceedences may have been. We would prefer to see explicit maps of all of the RAL exceedences, as well as the final SMAs, and some explanation of why specific areas were not included.	J Peers, Stratus	Potentially Acceptable	
	Evaluation of alternatives	**Unacceptable presentation/ interpretation of results.** The evaluation of alternatives will need to be redone to incorporate changes made to the evaluations that support it. Additionally, the scoring of alternatives should be completely reworked. The scoring methods are buried in Table 7.1-1 of Appendix U and not presented clearly in the main text of the document. The methods for scoring the alternatives currently apply criteria and scores for integrated alternatives that are different from those for removal-focused alternatives, which is entirely inappropriate. Additionally, many of the categories are based all or in part on the duration of the alternative, which, as mentioned above, should be reevaluated. This heavy emphasis on inappropriate estimates of durations appears designed to make the more active alternatives appear less desirable and more expensive.	J Peers, Stratus	Potentially Acceptable	
	Evaluation of alternatives	Conclusions: The FS concludes that all alternatives are equally protective and bases a significant portion of the overall effectiveness evaluation on the duration of the cleanup. As a result, remedial alternatives that remove more material or are of a greater duration receive a lower overall score. This outcome is based the failure to properly consider hot spots of contamination, adequacy of controls (which takes into account the amount of material left in place) and reductions in toxicity, mobility and volume through treatment and the uncertainty in long-term projections of risk reduction. In addition, the analysis does not properly consider sheet pile installation as a method to reduce water column impacts and perhaps shorten the duration of dredging activities at the site.	Blischke, CDM Smith	Potentially Acceptable	
	Benthic Risk Evaluation	**Potentially acceptable, use with caution, possibly request or develop additional maps** The general approach to mapping benthic risk seems reasonable. However, we note that empirical toxicity is considered to be the primary line of evidence – if there is no hit in the bioassay, any toxicity predicted by chemistry exceedences is disregarded. There are also some subjective assumptions about where to draw the boundaries of these areas that should be reviewed carefully. We would prefer to see explicit maps of each of the benthic risk lines of evidence, followed by the final map of areas that screen in using the logical process outlined in Section 5.3.1.	J Peers, Stratus	Potentially Acceptable	
	Benthic Risk Evaluation	The evaluation of benthic risk must be resolved in order to evaluate the protectiveness and long term effectiveness and permanence of the various remedial alternatives. The FS presents an approach which may not be consistent with EPA comments on the revised draft of the BERA. In	Blischke, CDM	Potentially Acceptable	

		addition, the evaluation of protectiveness and long term effectiveness and permanence includes the use of long term modeling results averaged over a ½ mile area. This may be too large to evaluate effects on the benthic community. Although the RALs evaluated in the FS will address the majority of contamination presenting risk to human health and the environment, the exception to this is the benthic risk areas. Sufficient information is available to identify the benthic risk areas based on a multiple lines of evidence approach. Burt Shephard should review site information presented in the revised draft BERA and identify benthic risk areas for use in the draft FS.	Smith		
	Oregon Hot Spots	**No comment** We defer to the State of Oregon on whether this evaluation is acceptable.	J Peers, Stratus	Potentially Acceptable	
	Oregon Hot Spots	The FS did not identify any hot spots of contamination as outlined by the State of Oregon Cleanup law. Under state law, hot spots of contamination have a higher cost threshold for removal and treatment. Chemical concentrations of PCBs (including PCB congener 126) and BaPEq (including BaP individually) exceed high concentration thresholds. Hot spots of contamination appear to be present at eight key contaminated sediment source areas at the Portland Harbor site (OSM, Schnitzer International Slip, GASCO, Arkema, Willamette Cove, Swan Island Lagoon, Gunderson and River Mile 11E). This places a higher threshold for evaluating the cost reasonableness of removal and treatment technologies and will have a large outcome in the evaluation of remedial action alternatives in the FS. Oregon DEQ should apply its rules to identify hot spots based on the high concentration and highly mobile/not reliably containable threshold. Identified hot spots should be evaluated with a higher cost threshold for removal and disposal.	Blischke, CDM Smith	Potentially Acceptable	
	Remedial Technologies Selection	**Generally acceptable, concerns noted in subsequent comments** The types of remedial technologies considered are reasonable for a site such as Portland Harbor. However, we have concerns about the screening of several of these technologies, which are expressed below. We do not have any concerns on the screening of the other technologies.	J Peers, Stratus	Potentially Acceptable	
	Remedial Technologies Selection	**Selection of specific technologies within integrated alternatives**. It is unclear how specific technologies were designated for individual sub-SMAs. Descriptions in section 5-4 and technologies table 7.2-1 are somewhat helpful, but it does not make clear which remedies will be applied for what reason or under what conditions. If this material is in an Appendix somewhere, it should be brought forward as it is fundamental to evaluating alternatives. The lack of consideration of environmental conditions for selecting some remedies is disconcerting. For example, it appears that in-situ treatment is designated for open water areas without consideration of sediment slope or water flows. Language in Chapter 7 seems to relate that all integrated remedies would be interchangeable. A new table or figure should be developed that clearly depicts the decision tree for determining which remedies are applied in which areas for what reason. The text should further explain and support this process. At present, the presentation of this fundamental component of the FS is unclear and inadequate. If it's not relevant or necessary to designate specific remedies among the "I" alternatives, this should be described in a clearer fashion than the text presented on p 7-4.	K Gustavson, Corps	Potentially Acceptable	
	Remedial Technologies Selection	**Acceptable, review structures for potential for removal** Sub-SMAs - We agree that information about uses is useful for determining the feasibility of remedial technologies. However, we disagree that all structures affect implementability of dredging. A review of structures should be conducted to see which are potentially removable or replaceable.	J Peers, Stratus	Potentially Acceptable	
	Remedial technologies – active capping	**Generally acceptable, one minor concern.** In general, the evaluation of active capping is appropriate. However, the effectiveness evaluation for active capping assumes that groundwater plumes in SMAs 9U and 14 will be controlled and will naturally attenuate. The timeframe for attenuation is not discussed; ongoing contamination from groundwater may affect the short-term (and possibly long-term) effectiveness of active capping.	J Peers, Stratus	Potentially Acceptable	
	Integration of Source Control Measures	Assumptions regarding the degree of source control is a fundamental element of the FS. The FS assumes that source control measures will be in place. At sites such as the GASCO site, assumptions regarding the degree of hydraulic control achieved by the source control measure have a direct impact on the effectiveness evaluation of the capping and reactive capping technologies. It will be important to ensure that there is a common understanding of source control in order to properly evaluate certain remedial technologies at the site.	Blischke, CDM Smith	Potentially Acceptable	
	Integration of Source Control Measures	**Integration with Upland Source Control** The effectiveness of the sediment remedy will be closely tied to the effectiveness of upland source control efforts. There should be a more complete evaluation and analysis of how these efforts will be integrated. We recognize that this is a very challenging technical issue that may require a significant monitoring and adaptive management effort. It should also enter into decisions on implementation schedules for both upland and sediment remedies. **We recommend that the integration of the upland/sediment remedies be discussed in detail in the FS and or in the Proposed Plan.**	Wagoner/ Dexter, Ridolfi	Potentially Acceptable	
	HEC-RAS hydrodynamic model	**No comment.** We have not identified any concerns with the HEC-RAS model at this time.	J Peers, Stratus	Potentially Acceptable	
	Bioaccumulation model	**No comment.** We have not identified any concerns with the bioaccumulation model at this time.	J Peers, Stratus	Potentially Acceptable	

	Disposal options	**Generally acceptable, may need some rethinking and additional work.** As with technology assignments, the decision of where to dispose of sediments should be based on the nature of the contamination in the sediment and the feasibility of the disposal sites. The sediments with the highest levels of contamination should not remain in Portland Harbor or be placed elsewhere in the Willamette River; they should be placed in appropriate upland disposal sites. The selection of disposal sites should be grounded in reality – we recommend removing disposal sites that are unlikely to be approved from the FS evaluation. Finally, we believe that additional opportunities for disposal should be considered that were not included in the FS, such as the construction of a dedicated Portland Harbor facility.	J Peers, Stratus	Potentially Acceptable	
	Uncertainty and sensitivity evaluations	**Use of uncertainty and sensitivity evaluations.** The uncertainty evaluation included in the FS are summarized in Chapter 10. The take home message is "The reliability of the MNR technology was evaluated through an uncertainty analysis (Appendix U, Section 5). This evaluation indicated that the natural recovery and modeling uncertainties are small compared to the RG and SMA uncertainties (Figure 10.2-1)." This type of comparison is not scientifically credible. A calibration constrained sensitivity analysis does not represent the uncertainty of a model's predictions for depicting environmental conditions; it represents the variation seen in model results when a few select parameters are varied. Subsequent comparisons to the range of potential remedial goals and the assertion that the comparisons have meaning are not appropriate.	Gustavson, Corps	Unacceptable	
	Cost estimates	**Unacceptable, use base information and rethink.** Primarily because of our concerns with construction sequencing and durations, we find the cost estimates unacceptable. We have no reason to dispute the base information and believe that the cost estimates can be reworked relying on the available information.	J Peers, Stratus	Potentially Acceptable	
	Cost estimates	The cost estimate prepared by LWG was created in a proprietary Excel based program which is locked and cannot verify the accuracy of all the values. The estimate narrative and associated spreadsheet's complete and easy to follow. A number of details are not clear, as noted in detail in comments on Appendix K. Production rates for backfill seem reasonable however the production rates for dredging seem a bit slow.	Sanders, CDM Smith	Potentially Acceptable	
	Use of Mean Quotients	The mean quotient approach to risk assessment is too weak. There should be a "do not exceed" value for individual chemical hazard quotients so that a high risk from a single chemical is not masked by low results for other chemicals.	Neely, NOAA	Unacceptable	
	Background	**Cleanup to Background** Remedial Alternative G was developed to evaluate cleanup to "background" concentrations for chemicals including PCBs. However, LWG dropped the alternative relatively early in the FS because, according to the natural recovery assumptions in their analysis, it did not offer any benefit relative to Alternative F. We view this as a biased analysis because, as mentioned previously, it seems that the models over-predict the amount of deposition that is occurring in the study area. **We recommend that a target of cleaning sediment to background be retained in the FS and or in the Proposed Plan.**	Wagoner/ Dexter, Ridolfi	Potentially Acceptable	
	CDFs and CADs	*Confined Disposal Facilities (CDFs) and Confined Aquatic Disposal Cells (CADs)*: NOAA has, over the years, consistently communicated to EPA our concerns regarding CDFs and CADs. • CDFs and/or CADs could adversely impact or destroy substantial areas of critical habitat. • CDFs and/or CADs could present a potential ongoing risk to ESA-listed and other species associated with the threat of chronic post-remedial action releases of toxic concentrations of contaminants. This becomes a long term problem, from an ESA standpoint, in that it may not or does not lead to recovery and has ongoing impacts to listed fish for the life of the project. While it may be possible (though difficult and very expensive) to mitigate for the CDF impacts, it is unclear to NOAA how one would mitigate (even off-site) for adverse effects to ESA-listed and other species resulting from exposure to CDF leachates over the life of the projects.	Neely, NOAA	Potentially Acceptable	
	Columbia River Protection	**Elimination of Toxic Releases to the Columbia River** Contaminated sediment has been and continues to be a source of contamination to the Colombia River that is or has the potential to impact natural resources that are protected under Treaty between the US Government and the Yakama Nation. The FS should for both upland and sediment remedies. **We recommend that the long-term effectiveness of the alternatives are evaluated based on their ability to control releases from the site that might be transported to the Columbia River.**	Wagoner/ Dexter, Ridolfi	Potentially Acceptable	
	ESA Consultation	NOAA or the National Marine Fisheries Service does not anticipate conducting a programmatic ESA consultation on the remediation actions in Portland Harbor. Actions covered under programmatic consultations are typically of a repetitive nature with minor impacts and predictable outcomes. NOAA's current programmatic opinions specifically exclude Portland Harbor because the presence of contaminants at levels presenting unacceptable risks strongly suggests that minor impacts and predictable outcomes are unlikely. In addition, based on the proposed alternatives in the draft FS and our lack of confidence that certain aspects of the proposed alternatives will meet the needs of ESA-listed NOAA trust resources, NOAA will carefully review each individual proposed clean-up action in the harbor to ensure they are protective of said resources. Consequently, NOAA's *Biological Opinion* on EPA's Proposed Plan will not have an incidental take statement, and will defer to individual consultations on specific remedial actions. At this time, NOAA will not be reviewing or commenting on the preliminary draft site-wide *Biological Assessment* submitted by LWG.	Neely, NOAA	Potentially Acceptable	
	Mitigation	It does not appear that NOAA's previous comments from the draft FS check-in (transmitted April 5, 2011) were incorporated into Appendix M of	Neely,	Potentially	

		the draft FS. With respect to these comments, LWG should be reminded that mitigation under the Clean Water Act and ESA are not and one and the same. Furthermore, for ESA mitigation NOAA will not be considering mitigation at the scale of the 4th field Hydraulic Unit Code. Upper Willamette River (UWR) ESA-listed salmonid stocks or Lower Columbia River (LCR) ESA-listed salmonid stocks (or the specific impacted life stages of these stocks) could be omitted. Because mitigation will need to be provided for both UWR and LCR stocks impacted by any action that decreases habitat values in Portland Harbor, all such species and associated life stages (of the affected evolutionarily significant units/distinct population segments) must be taken into account when selecting mitigation sites. In addition, the location where the habitat degradation occurred will be heavily considered when deciding on the appropriate location for mitigation. Mitigation within the Site will be a priority for ESA purposes.	NOAA	Acceptable	
	Human Health vs. Ecological Risk	NOAA notes that the draft FS focuses primarily on human health risks (particularly cancer risk). NOAA anticipates that, in many instances, appropriate remedial actions undertaken to address human health cancer risk will incidentally address, in whole or in part, risks to ecological receptors. However, to ensure ecological risks are adequately addressed, NOAA encourages EPA to select (or develop, if necessary) remedial alternatives that result in clean-ups that are adequately protective of listed species (considering background levels) and other ecological receptors.	Neely, NOAA	Potentially Acceptable	
	Risk Reduction (Circle-back)	**Risk Reduction Evaluation** The draft FS relies on remedial action goals (RALs) that were developed some time ago. These RALS are useful for identifying priority areas and establishing a first delineation of the extent of those areas that need to be remedies. However, the FS did a limited job of addressing the risks to human and natural resources that were identified in the risk assessments. It is not clear to what extent all risks from all substances will be eliminated by the proposed remedies. **We recommend that the FS or Proposed Plan include discussions of the risks identified in the risk assessments, and estimate the effectiveness of each remedy in addressing each of those risks**	Wagoner/ Dexter, Ridolfi	Potentially Acceptable	
	Risk Reduction (Circle-back)	Because the FS focuses on indicator chemicals to identify key areas of concern, there should be a "circle-back" to confirm that the selected alternative adequately addresses other chemicals to evaluate if unacceptable levels of other contaminants remain.	Blischke, CDM Smith	Potentially Acceptable	
	Adaptive Management	Due to the high degree of uncertainty in monitored natural recovery, EPA should use the analysis presented in the draft FS along with any supplemental analysis to support remedy that relies on adaptive management approaches. It is clear that there are many areas at the Portland Harbor site that will require some combination of dredging, capping (standard and reactive), in-situ treatment and enhanced monitored natural recovery. EPA should use standard FS tools such as risk reduction/volume or cost estimates along with the results of the contaminant fate and transport model to determine the size and number of areas that will require active remediation. Once these areas have been identified with sufficient confidence, the remaining areas should be addressed through an adaptive management approach (e.g., interim or contingency ROD).	Blischke, CDM Smith	Future	
	Additional Technical Issues/ Parking Lot				
		Contaminant Volume Estimates – has anyone looked at this in detail, any major issues, and does this matter for decision making?	Blischke		
		Recontamination Analysis (including cap models and stormwater assessment). Is recontamination evaluation adequate?	Blischke		
		In Situ treatment – is it adequately evaluated? Treatability studies may be appropriate during remedial design.	Blischke		

Comment No.	Section	Section Number	Page Number	Figure /Map No.	Detail Comment	Reviewer
	Introduction	1.0	1-1		The end of Section 1.0 states: "there are notable differences in how the alternatives achieve this protection, with some alternatives having substantially more environmental, community, and worker impacts; differing implementability issues; and varying high costs." The FS should be clear about other factors such as time to achieve protectiveness and long-term effectiveness when summarizing the limitations of various remedial alternatives.	Blischke, CDM
	Physical System	2.1	2-2		Section 2.1 almost exclusively discusses industrialization of the Lower Willamette River within Portland Harbor. While it is true that "this river reach differs substantially from its pre-developed characteristics related to hydrodynamics, sediment transport, and ecological habitat and function" it is also true that the river provides habitat for a range of species including special status species such as salmon and Bald Eagles and that the river experiences frequent recreational uses including boating and fishing.	Blischke, CDM
	Hydrology	2.1.1	2-3		The draft FS Report states: "The draft final RI also estimated that the Portland Harbor area stormwater runoff volume contributions are between 0.06 percent for the wet year conditions (1997) and 0.08 percent for dry year conditions (2001) of the total Willamette River flow." While this information is accurate, it should also be noted that short term stormwater discharges can be a higher percentage of flow than the average flow conditions described above.	Blischke, CDM
	Chemical System	2.2	2-6		The FS Report describes the four "bounding chemicals." While it is true that these four "bounding chemicals" pose the majority of the risk at the site on a chemical by chemical basis, risks to the benthic community as estimated through multiple lines of evidence may exist outside the areas of risk identified by the four "bounding chemicals."	Blischke, CDM
	Transition Zone Water	2.2.3	2-10		The FS Report states: "There is considerable uncertainty as to whether some of the contaminants in TZW are truly associated with upland groundwater plumes." It is perhaps a matter of understanding the contribution from groundwater relative to contaminated sediments for chemicals that are also present in sediments at high concentrations such as PAHs and DDx.	Blischke, CDM
	Chemical Distribution	2.6.2	2-41		The FS Report States: "Most areas of elevated contaminant concentration in bedded sediment are located in relatively stable nearshore areas, and large-scale downstream migration/dispersal of concentrated contaminants from these areas is not indicated by the bedded sediment data." This statement is contradicted by the distribution of PAH and DDx contamination at the site which shows a clear pattern of downstream migration from the large sources present in the vicinity of RM 6.	Blischke, CDM
	Sources, Fate and Transport	2.6.3	2-42		While it is true that Most of the sediment contamination at the Site is associated with known or suspected historical sources and practices that have largely been discontinued or otherwise controlled, there are instances, such as the GASCO and Arkema sites where ongoing migration of contamination from historical upland sources continue to serve as a source of in-water sediment contamination. In addition, while it is also true that "For PCBs and DDx, the main external ongoing sources quantified for the draft FS are upstream surface water inputs encompassing all upstream watershed sources" it is also true that localized sources of PCB and DDx contamination associated with upland sources exist within the Portland Harbor study area. For example, PCBs in stormwater at the Schnitzer site and the aforementioned DDx contamination at the Arkema site. The FS report seems to acknowledge this possibility with the following statement: "However, stormwater sources may have localized impacts on bedded sediment concentrations, although this effect is difficult to quantify on the scale of the entire Site." This limitation should be explicitly acknowledged when assessing the effectiveness of MNR at the site based on application of the site-wide fate and transport model.	Blischke, CDM
	Sources, Fate and Transport	2.6.3	2-43		The major fate and transport properties described on Page 2-43 should include physical mixing and bioturbation would could have an effect on contaminant distribution.	Blischke, CDM

	Sources, Fate and Transport	2.6.3	2-43		The FS Report states: "there is little in the empirical information from sediment contaminant profiles or fate and transport modeling results to suggest that buried contamination is a substantial or ongoing source to surface sediment contamination, through dissolved phase advection or any other process, over the vast majority of the Study Area." If this statement is in fact true, then what is the explanation for elevated levels of PAH and DDx contamination offshore of the GASCO and Arkema sites respectively despite the fact that the releases to the river ceased in the 1950s.	Blischke, CDM
	Current and Likely Future Risk	2.6.4	2-46		The discussion of ecological risk almost totally ignores risks to the benthic community. Risks to the benthic community may be significant from the standpoint of identifying areas of risk not associated with the key contaminants at the site (PCBs, PAHs, DDx and Dioxins/Furans).	Blischke, CDM
	Selection of Chemicals of Concern	3.1.2	3-5		Additional justification for the selection of COCs is required. The COCs presented for human health seem acceptable. However, the basis for selecting ecological COCs in not adequately presented. Additional information in support of the ecological COCs should be included in the draft FS.	Blischke, CDM
	RAO Considerations	3.2.1	3-8		RAOs are media and exposure pathway goals for protecting human health and the environment. The risk assessment identifies those chemicals that pose potentially unacceptable risk. It is not necessary for the FS to evaluate all chemicals that pose potentially unacceptable risk as long as the FS can document the degree to which each alternative will achieve the RAOs. As a result, the FS can limit the chemicals that will be evaluated as long as all chemicals identified that pose potentially unacceptable risk are considered when assessing the protectiveness of the each remedial action alternative evaluated in the FS.	Blischke, CDM
	RAO Considerations; RAO 3.	3.2.1	3-4		Carcinogenic PAHs exceed the 10-6 risk level based on a drinking water exposure scenario. In addition, although depth integrated surface water samples do not exceed MCLs, some near bottom samples do exceed MCLs for chemicals such as vinyl chloride and benzo(a)pyrene. The draft FS states that RAO 3 is already being achieved. This is not necessarily accurate. It would be better for the FS to acknowledge the potential impact on the drinking water beneficial use of the Willamette River and note that upland and watershed wide source control efforts will be required to reduce contaminants associated with the drinking water exposure pathway.	Blischke, CDM
	Refinement of PRGs	3.5.2.1	3-29		The draft FS updated various PRGs including: • TBT: TBT was only found to pose a risk to ecological receptors at one location near the entrance to Swan Island Lagoon. The LWG has revised developed a revised TRV for evaluating risks from TBT and has determined that TBT no longer poses a risk to ecological receptors. However, sufficient documentation of the revised TBT TRV S is not provided in the draft FS. • Aldrin: The PRG for Aldrin was exceeded at isolated areas offshore of the Gunderson, Arkema and GASCO sites. The PRG for large home range fish (small home range fish do not pose risk to human health) is not exceeded on a site-wide SWAC basis. • DDE: Further discussion of the DDE PRG refinement is required. • Arsenic: Arsenic background levels were not exceeded on a site wide basis. However, localized areas of arsenic contamination were identified at levels that exceed direct contact PRGs. • Benzo(a)Pyrene: The draft FS recommends giving the clam consumption PRG low weight due to a number of uncertainties surrounding this pathway. EPA should evaluate the PRGs to determine which changes are appropriate. I may be appropriate to eliminate TBT based on the limited risk presented by TBT but not arsenic due to localized areas of arsenic sediment contamination above direct contact PRGs. Regarding BAP and the clam consumption scenario, no action is recommended at this time until further implications of the use of the clam consumption scenario to set cleanup levels is understood.	Blischke, CDM
	RAL Development	4.2	4.5		The RAL evaluation methods focus on incremental SWAC reduction. The analysis should be	Blischke, CDM

	Methods				focused on risk reduction rather that SWAC reduction. Risk reduction should be considered over a variety of exposure scales consistent with the risk assessment assumptions. The information in Table 4.3-1 illustrates this point since the SWACs are averaged across the river when much of the exposure may be taking place in the near shore areas. It may also be that much of the MNR is taking place in the near shore areas which tend to be depositional and dominated by fine-grained sediment rather than the higher energy navigation channel which experiences prop wash and sand waves and is dominated by coarse-grained sediments.	
	RAL Range Selection and Detailed Methods by COC	4.3	4-8		Given the uncertainty in the long-term predictions, and that fact that for many areas, no appreciable reduction in contaminant concentrations are observed at T=10 year between various active remediation scenarios when we know that this is not the case given that the site has been under investigation for 10 years with no discernable reduction in contaminant levels, the evaluation of remedial action alternatives should be based on the T=0 risk contaminant concentration reduction curves. For example, the total PCB RAL curve for RM 11 – 11.8 presented in Appendix Db shows significant levels of reduction associated with the various RALs for the T=0 curve but does not show any reduction for the T=10 year curve. It should be further noted that this reach of the river is not particularly depositional in the area where the contamination is present (See Figures 2.1-2 and 2.1-3) and is subject to anthropogenic effects (prop wash and maintenance dredging) will are expected to limit the effectiveness of MNR.	Blischke, CDM
	Physical Feature Sub SMA Types	5.4.2		Table 5.4-1	The physical features presented in Table 5.4-1 should be expanded to include areas of erosion/deposition, debris areas, areas targeted for future redevelopment, habitat areas, slope, presence of underwater utilities, presence of bedrock outcrops within the sediment bed, hot spots and areas with principle threat material (e.g., NAPL), areas with active upland sources or where source control is required to prevent recontamination.	Blischke, CDM
	Potential Oregon Hot Spots	5.5.1		Table 5.5-1	Table 5.5-1 presents theoretical hot spots for certain PCB congeners. Based on whole body fish consumption and PCB 126, hot spot thresholds of 0.015 and 0.090 ug/kg can be specified. This results in hot spots of contamination at OSM, Schnitzer International Slip, Willamette Cove, Swan Island Lagoon, Gunderson and River Mile 11E. In addition, hot spots of contamination are present at GASCO and Arkema based on the presence of NAPL and elevated levels of PAHs and DDx respectively. For example, numerous surface sediment samples collected offshore of the GASCO Site exceed the direct contact hot spot thresholds of 16,200 ug/kg and 42,300 ug/kg developed for benzo(a)pyrene. This results in the 8 key areas across the Portland Harbor site where a preference for treatment or removal and disposal is required as part of the FS evaluation.	Blischke, CDM
	Principal Threat Material	5.5.2	5-19		The presence of free product at the GASCO and Arkema sites indicates that principle threat material is present.	Blischke, CDM
	Erosion from River Currents	5.6.1	5-22		The draft FS states: "Expected changes in surface sediment concentrations due to river current erosion are relatively small and short in duration." While this statement is true do the likelihood of the deposition of clean material as currents slow and material drops out of suspension, the potential for contaminated material to be scoured and transported downstream exists.	Blischke, CDM
	Wind/Wake Wave Generated Erosion	5.6.3	5-24		Wind and wake driven waves are likely to be significant especially given the seasonal changes in river elevation. This change in river stage will tend to expose a significant bank zone to waves of sufficient strength to generate erosional forces that must be considered in the FS.	Blischke, CDM
		5.6.4	5-26		The draft FS states: Any potential FMD areas with an exceedance of more than two times the RAL in those horizons was added to its nearest surface SMA. Although EPA acknowledges the uncertainty, the factor of 2 times seems arbitrary. It is more defensible to use the RAL directly. The FS further states in the evaluation of subsurface contamination that very little subsurface contamination that is also include in the SMAs based on surface contamination exists. This pattern would seem to hold true for the FMD areas as well. FMD areas that are within SMAs should have a preference for removal similar to that applied to the navigation channel areas to minimize the potential for disturbance resulting from dredging activities.	Blischke, CDM

	Analysis of TZW Impacts in and near SMAs	5.7	5-30		The FS Report states on page 5-30: "The BERA recommended that only those TZW COPCs with an HQ greater than or equal to 100 be considered as COCs to develop and evaluate remedial alternatives that are protective of ecological resources." EPA has not agreed to this risk management determination.	Blischke, CDM
	Identification of Technologies	6.1	6-2		The discussion of MNR should note that deposition by clean material is the primary natural recovery process at the Portland Harbor site (and other sediment sites nationally). The discussion of in-situ treatment should note that in-situ treatment in combination with EMNR may be effective for both chemical and physical isolation of contaminants.	Blischke, CDM
	Identification of Technologies	6.1	6-3		The FS Report states: "Specifically, a wide range of experience at other sites has demonstrated that resuspension of contaminated sediment and release of contaminants occurs during dredging, and that contaminated sediment residuals will remain after operations." While this statement is true, the discussion should also note that resuspension and release may be controlled through the use of water quality controls such as sheet piles and silt curtains and that residuals may be managed by placement of a clean sand layer as soon as is practicable following completion of dredging activities.	Blischke, CDM
		6.2		Figure 6.2-15	Instead of portraying the surface/subsurface ratios onto the model grid, thiessen polygons should be developed for the sediment cores and the data mapped.	Blischke, CDM
	MNR Effectiveness	6.2.2.1	6-8		The temporal trend data needs to correct for the sample locations. For example, at RM 1.9 – 3, most of the later samples were collected outside the main area of PCB contamination. In addition, the McCormick and Baxter data, while reflecting a long time period, also incorporates the timeframe of the sediment cleanup which took place in 2005. Furthermore, in the early 1990s, McCormick and Baxter was in the process of being shut down and the equipment and buildings abandoned. If the 1990 data is eliminated from the analysis, there is virtually no temporal change noted in benzo(a)pyrene and naphthalene levels.	Blischke, CDM
	MNR Effectiveness	6.2.2.1	6-8		MNR Effectiveness: Many of the MNR effectiveness lines of evidence demonstrate that MNR may be effective in some areas of the site. This is based on a review of incoming sediment concentrations, surface to subsurface sediment ratios, bathymetric change maps and grain size analysis. However, it should be noted that MNR is unlikely to be effective at all locations. For example, just off shore of the GASCO site, the surface sediment PAH levels are much higher than subsurface sediments. This is also an area that is dominated by coarse grained sediments. These lines of evidence suggest MNR may have limited effectiveness in the vicinity of the GASCO site.	Blischke, CDM
	MNR Effectiveness	6.2.2.1	6-8		The weight of evidence evaluation presented is based on one river mile reaches. This scale is too coarse to be meaningful. For example, between RM 11 and 11.8, the analysis concludes that this reach is generally not likely to recover. However, there are significant differences between the east and west sides of the river due to anthropogenic effects such as dredging and propwash. As a result, the west side of the river is likely to recover more quickly than the west side. Similarly, the draft FS report notes the variability within RM 5 – 6: The upper portion contains mostly Category 2, with some Category 3 and Category 1 areas, while the lower portion is mostly Category 3, with some Category 2 areas." This variability should be taken into account when mapping the SMAs (e.g., incorporate into the Figure 5.8-1 series), screening remedial technologies and evaluating remedial action alternatives.	Blischke, CDM
	MNR Effectiveness	6.2.2.1	6-8		While the draft FS Report notes that the: "1-mile average basis, which is the smallest relevant spatial scale consistent with the risk assessment" this scale may not be relevant from the standpoint of evaluating remedial technologies.	Blischke, CDM
	MNR Effectiveness	6.2.2.1	6-8		However, overall, the reaches identified as category 1 and 2 (RM 5 – 7, RM 11 – 11.8 and Swan Island Lagoon appear to be the primary areas where MNR is less effective. It should be further noted that these areas incorporate many of the primary source areas at the site (RM 11E, Portland Shipyard, Arkema, GASCO/Siltronic and Willamette Cove).	Blischke, CDM
	EMNR Effectiveness	6.3.2.1	6-34		The discussion of the effectiveness of EMNR should take into account anthropogenic impacts.	Blischke, CDM

					Due to dredging and propwash, it seems unlikely that EMNR would be effective in the RM 11E area. Propwash should be taken into account in assessing the effectiveness of EMNR in Swan Island Lagoon.	
	Capping Effectiveness	6.2.5.1	6-46		The capping effectiveness evaluation should consider hydrophobic, bioaccumlative contaminants with low human health AWQC such as PCBs in addition to the more mobile groundwater contaminants such as benzene, chlorobenzene and vinyl chloride. Points of compliance should near bottom surface water concentrations rather than a depth integrated surface water prediction to account for bottom feeding fish and epibenthic invertebrates.	Blischke, CDM
	Implementability (Reactive capping)	6.2.6.2	6-54		The reactive capping effectiveness discussion should note that reactive capping may reduce the overall thickness of the cap thus allowing placement in areas that would otherwise not be capable due to water depth requirements.	Blischke, CDM
	Implementability (Disposal)	6.2.9.2.2	6-95		On-site disposal options will need to go through the appropriate permitting steps such that the substantive requirements are met. On-site CADs and CDFs will need to consider the potential for flood rise. More detail regarding these steps will be required once an on-site disposal site is selected.	Blischke, CDM
	Screening the Alternatives	7.1	7-1		Alternative G was screened out. It should be noted that Alternative G was screened out based on area/cost and post remediation SWAC only. The evaluation did not consider the various remedial technologies that would be brought to bear in the areas identified based on the most conservative RALs. While this may be acceptable, this point should be acknowledged.	Blischke, CDM
	Remedial Technology Options	7.2	7-4	Table 7.2-1	The draft FS Report states: The assignment of technologies for removal versus integrated options is summarized in Table 7.2-1. However, the factors considered for the purpose of identifying the various sub-SMAs is limited. There are number of key site specific factors that are not taken into account when designating sub-SMAs. These include erosion/deposition areas, current and future land and waterway use, contaminant mobility, potential hot spots of location, etc. Use of a more comprehensive set of physical, contaminant and land and waterway use characteristics will allow for development of a more refined set of remedial alternatives to be evaluated in the draft FS (See Section 5.4 Comments).	Blischke, CDM
	Remedial Technology Options	7.2	7-4		The draft FS defines "in-place technologies" to include a "suite of potential in-place technologies" that "could include EMNR (thin-layer sand placement), in situ treatment (placement of AC or a similar reagent onto surface sediments), engineered caps (including armor layers, habitat layers, and/or other variations), or other similar in-place technologies." The draft FS report suggests that "this level of level of determination is more than adequate for draft FS purposes, and the specific applications of in-place technologies would be determined during SMA-specific remedial designs based on more detailed engineering evaluations" EPA disagrees with this contention. Site specific factors will determine the effectiveness of these "in-place technologies." Site specific information should be used to evaluate the overall effectiveness, implementability and cost of the various "in-place technologies" to ensure that the FS develops the appropriate range of technologies and evaluates these in an objective manner consistent with the NCP.	Blischke, CDM
	Remedial Technology Options	7.2	7-4		The draft FS Report acknowledges the limitations of this assumption by developing two cost estimates one of which "assumes engineered caps in all of the in-place technology subSMAs, while the other cost estimate assumes in situ treatment in all of the in-place technology subSMAs, except the wave zone." Similar to the need for two cost estimates for engineered caps and in-situ treatment, additional factors related to effectiveness, implementability and cost across the entire range of "in-place technologies" is required.	Blischke, CDM
	Remedial Technology Options	7.2	7-5		Some simplifications may be appropriate. For example, as described on page 7-5, "the "in situ treatment" option evaluated for the integrated alternatives throughout the remainder of this draft FS can be viewed as in situ treatment and/or EMNR" because the implementability, long-term and short term effectiveness are expected to be similar. However, as also noted in the FS, EMNR will not get credit for treatment.	Blischke, CDM
	MNR	7.3.2	7-6		The draft FS Report states: "areas of active remedy (SMAs) were not expanded to include	Blischke, CDM

					areas of potentially limited natural recovery except in SMA 17S (Swan Island Lagoon)." It would seem that areas where MNR is not expected to occur to a significant degree should be targeted for EMNR in a manner similar to the approach taken for SMA 17S in areas where EMNR is expected to be effective and implementable and in areas where RGs are exceeded.	
	Emperical Lines of Evidence	6.2.2.1.1	6-15		Sediment Trap Samples section, page 6-15: Note that onsite sediment trap polychlorinated biphenyls (PCB) data are well above the 5-20 ppb range shown in the offsite samples, and therefore some resuspension of onsite sources or ongoing sources is evident (i.e., this should not be used as evidence that MNR by itself will be successful).	French, CDM Smith
	Predictive Modeling Tools	6.2.2.1.2	6-22		"These models have been EPA approved" is not an accurate statement and should be revised.	Neely, NOAA
	Weight-of-Evidence Assessment of MNR Effectiveness	6.2.2.1.3	6-22		In general, weight of evidence (WOE) approaches can be well-suited for evaluating the relative strengths and weaknesses of remedial alternatives, but only when inconsistencies between lines of evidence (LOE) are addressed and each LOE is assigned an appropriate weight and significance in the overall framework. In the case of the WOE analysis for MNR in the Site, NOAA has identified what we believe are some significant flaws that lead to overly optimistic predictions for MNR success. The following revisions should be made to produce a more reliable analysis: • Future Maintenance Dredge areas should *all* be ranked as Category 1 (unlikely to recover) rather than assigning shallow-use areas to Category 2. Any dredging at all would be sufficient to disrupt MNR: it does not matter if the target final depth is 10 ft or 50 ft, it only matters how much is being taken off in a single dredging event. • Net sedimentation rate (NSR) (page 6-25): "Areas within the uncertainty range of the surveys were assigned to Category 2". This is not consistent with the description of Category 2, which states: "Category 2 was assigned to areas where a given LOE suggests that natural recovery will likely occur, but the degree of effectiveness is less certain." This LOE does not suggest that natural recovery will "likely occur" if the surveys are not observing net sedimentation. Such areas should be Category 1. • Surface/Subsurface concentration ratios: it is fine to use PCBs as a surrogate for screening purposes, but this should be verified to ensure that locations with ongoing sources of other contaminants are not left to MNR. • "Areas where ... subsurface concentrations are within a factor of 1.5 of the [surface] concentrations... were assigned to Category 2." As noted for the NSR LOE, this indicates that concentrations are approximately stable over time, thus recovery is not occurring, so such areas should be reclassified as Category 1. • Model-predicted half-lives: using 10 and 20 years as cutoffs for half-lives is arbitrary and not justified. Rather than looking at half-lives, it would make more sense to look at time to meet target concentrations. NOAA understands that the model has already been run for this question. If it is too complex to do this for all contaminants, then an alternative would be to use PCBs as a surrogate as was done for the surface/subsurface concentration ratios.	Neely, NOAA
	Weight-of-Evidence Assessment of MNR Effectiveness	6.2.2.1.3	6-24		"...because biological mixing processes measured at the Site (and incorporated into the predictive model) are also taken to extend to a depth of one foot, surface mixing associated with prop wash would have no net effect on the effectiveness of MNR in this setting." This statement is false because prop wash could resuspend contaminated sediment and transport it elsewhere.	Neely, NOAA
	Effectiveness	6.2.3.1	6-34		"Swan Island Lagoon is a quiescent area where the main limitation for potential natural recovery is lack of sedimentation. Thus, augmentation of sedimentation rates via EMNR would	Neely, NOAA

					likely be highly effective here." NOAA disagrees with this interpretation. Another important limitation here is potential future dredging, which would reverse the effect of EMNR. See also page 7-7 which suggests EMNR in Swan Island Lagoon. What does the property owner plan to do with respect to dredging? On the other hand, the opposite argument is used for river mile 11-11.8: it "has significant areas of historical deposition as indicated by measured bathymetry changes … and thus EMNR may be effective in specific areas in this river mile." Given that there is already sedimentation occurring as indicated by bathymetry, and yet surface/subsurface concentration ratios are still high, this indicates there may be ongoing sources and/or mixing occurring, and thus it seems *unlikely* that adding more sediment would prove effective.	
	Effectiveness	6.2.3.1	6-35		: Given that Category 2 areas should be considered uncertain for MNR, these should be evaluated here, too (i.e. river mile 5-7). This area has more sediment transport occurring so material placed here is likely to be mobilized.	Neely, NOAA
	Grasse River, New York	6.2.4.1.2	6-40		bullet #3: "All of the delivered AC remained in place throughout the post-placement monitoring period." This is not accurate, according to the Activated Carbon Pilot Study Construction Documentation Report (2007) which states "on average, approximately 30 to 50 percent of the activated carbon mass applied to the Grasse River surface sediments was recovered in post-application samples using the BC-C technique…Small-scale spatial variability in the application of activated carbon is likely a significant contributing factor to the observation of unaccounted mass identified through the post application sampling results." NOAA commented on that report that we agree that the small-scale variability contributes to the lack of closure on the mass balance, but being able to account for only 30-50% of the mass of a material added to the river, in conjunction with not finding AC in sediment at depths greater than 3 inches, strongly suggests that AC was carried away from the test site. If AC is proposed for use at Portland Harbor, a pilot study to assess placement techniques would be needed.	Neely, NOAA
	Removal Best Management Practices (BMPs)	6.2.7.3	6-67		(Also see general comment above): The draft FS argues against the use of silt curtains and sheetpile walls as dredge BMPs, but for the following reasons, NOAA believes that silt curtains and sheetpile walls should be retained as options for remedial design in order to facilitate dredging in areas of higher contaminant concentrations. 1. Containment devices such as sheetpile walls and silt curtains will limit the spread of dredge residuals, thus enabling higher production rates and decreasing the total time needed to reach cleanup goals while minimizing adverse impacts to biota. Effective containment of contamination during dredging may allow dredging to occur outside the fish window, further accelerating the pace of cleanup. 2. The objections raised in the draft FS to the use of sheetpile walls and silt curtains can be overcome. • The draft FS predicts that high flow and scour near silt curtains will decrease their effectiveness: "Dissolved phase and particle bound PCBs were found to have migrated beyond the containment" because the "concentrated flow conditions beneath the silt curtains resulted in localized scour and resuspension" at Grasse River and the "double silt curtain system was abandoned after being determined to be ineffective due to variable current speed and direction" at Massena. Flow conditions on these rivers are not necessarily the same as those in potential dredging footprints at Portland Harbor. Most of the areas in Portland Harbor with	Neely, NOAA

					high contaminant concentrations (i.e. the areas most likely to be dredged) are near the riverbanks and thus have lower current speeds and a lower probability of release. • The draft FS predicts problems with stability of sheetpile walls due to scour. This can likely be overcome: for the dredging project on the Passaic River, flow modeling was conducted to determine likelihood of scour, and concrete pads were placed around the walls to prevent scour and stabilize the walls. Similar methods could be used at Portland Harbor if needed. • The draft FS describes the potential for silt curtains and sheetpile to obstruct boat traffic. This impact will depend on the location of the containment devices with respect to the navigation channel and should be minimal at Portland Harbor. The silt curtain used on the Hudson River was placed across the entire river channel and had to be opened frequently to allow boat traffic, but at Portland Harbor this could be avoided, as the areas to be dredged are near the riverbanks and are small enough to allow temporary isolation from the rest of the river (i.e. boats could go around without requiring the curtains to be moved). • The draft FS predicts difficulties with installing sheetpile amidst riverbed debris. A recent dredging project on the Passaic River successfully placed sheetpile in an area of large heavy debris pieces including discarded appliances, demonstrating that it can be done. They conducted reconnaissance using side-scan sonar to help with placement. • The draft FS describes the potential for installation or removal of sheetpile to release contaminants. This can be ameliorated by placing the sheetpile farther out around the boundary of contamination. • The draft FS describes the potential for contamination to leak out through gaps in a sheetpile barrier and cites Hudson River as an example of leakage problems. The containment at Hudson River, while imperfect, was better than no containment at all, and the EPA review of *Hudson River's Phase 1 Operations* (http://hudsondredgingdata.com/documents/pdf/EPA%20Oversight%20Report%20Final.pdf) concluded that containment should continue to be used. Acknowledging the possibility of leaks, monitoring should be conducted during dredging to evaluate the effectiveness of containment devices.	
	MNR	7.3.2	7-7		Because some areas are already below the likely remedial goals, "It should not be assumed that MNR is a necessity in all areas of the Site-wide AOPC, although for the purposes of this draft FS, MNR is assessed throughout the Site." Site-wide monitoring will still be necessary to see whether contamination is being redistributed around the Site and to assess exposures for receptors that use a broad area of the river.	Neely, NOAA
	MNR	7.3.2	7-6		The draft FS Report states: "areas of active remedy (SMAs) were not expanded to include areas of potentially limited natural recovery except in SMA 17S (Swan Island Lagoon)." It would seem that areas where MNR is not expected to occur to a significant degree should be targeted for EMNR in a manner similar to the approach taken for SMA 17S in areas where EMNR is expected to be effective and implementable and in areas where RGs are exceeded.	Blischke, CDM Smith
	General Approach	8.2.1	8-9		The sensitivity analysis presented in the draft FS was developed without prior agreement on the methods used to develop the results. At this point, the information could be useful in risk management context but should not be used in the analysis of remedial action alternatives in the draft FS. There is considerable uncertainty in every aspect of the FS – from the sediment characterization, to the risk assessment methods, to assumptions about releases during cleanup to long term projections in contaminant levels. The uncertainty in RGs is not unique in this aspect. EPA will have to consider uncertainty through an adaptive management approach for the cleanup. The proof will be in the decline in fish tissue concentrations to levels that allow a greater degree of fish consumption while being protective.	Blischke, CDM Smith

	Overall Protection of Human Health and the Environment	8.2.2	8-9, 8-29		The technology specific subsections presented in this section make general statements about the overall protectiveness of the various remedial technologies. However, because the discussion is so general, it does provide useful information. For example, under dredging, the draft FS Report states: "environmental dredging/removal may provide moderate to high level of risk reduction and low to moderate residual risk, depending on the effectiveness of dredging and use of backfill material." While this statement is true, there a numerous site specific factors that come into play such as the concentration left behind, the thickness and type of cover applied, the physiochemical properties of the contaminant, the potential for erosion. Without an understanding of these site specific factors, it is not possible to understand the degree to which removal technologies will reduce risk.	Blischke, CDM Smith
	Overall Protection of Human Health and the Environment	8.2.2	8-11		The draft FS Report states: "all the alternatives will be achieving concentrations that are within the range of available background estimates on a Site-wide basis, which is the most appropriate spatial scale for background comparisons." Achieving background on a site-wide basis may not necessarily be the most appropriate spatial scale if non-depositional areas with high levels of contamination still persist at the site. The draft FS Report tends to overly rely on site-wide averages to demonstrate risk reduction.	Blischke, CDM Smith
	Overall Protection of Human Health and the Environment	8.2.2	8-10, 8-27	Figure 8.2.2-1	The plots presented in Figures 8.2.2-1 through 6 show that there is essentially no reduction in surface sediment concentrations associated with Alternative F-r (the most aggressive alternative evaluated in the draft FS Report) until year 25. Even accounting for the releases during dredging activities, it does not seem reasonable to assume that no reduction in surface concentrations are achieved despite many years of active remediation. The BMPs described in the FS such as the use of silt curtains or sheet pile containment and the placement of clean backfill immediately following dredging activities should improve the overall effectiveness of dredging. At OU-1 of the Fox River site, where neither silt curtain nor sheet pile controls were required during dredging activities, fish tissue concentrations declined rapidly in response to the cleanup action. As stated in Lower Fox River Operable Unit 1 Post-Remediation Executive Summary: " The OU1 remedy was implemented from 2004 through 2009 and resulted in a reduction of PCB concentrations in 2010 for the three media of interest: fish, sediment, and water." And "For walleye, the ROD remedy versus natural recovery reduced the PCB fish tissue concentration by 73%. That is, the natural recovery remedy for walleye would reach this same level of PCB fish tissue concentration in approximately 15 to 20 years." These sort of results demonstrate the long-term effectiveness of dredging as component of sediment remedies. The failure of the draft FS to document these reductions demonstrates the bias associated with the long term effectiveness evaluation of dredging in the draft FS.	Blischke, CDM Smith
		8.2.2	8-10, 8-27	Figure 8.2.2-1	More clarity is needed regarding sequencing assumptions. Explain why concentrations do not decrease as quickly under Alternative F compared to other alternatives. Alternative F would be more effective if it targeted the same areas as the other alternatives for the first ~10 yrs and then continued to clean up additional areas. In general, the most contaminated areas should be addressed first in any cleanup alternative.	Neely, NOAA
	Overall Protection Evaluation - MNR	8.2.2.2.1	8-13		The draft FS Report notes that "show 88 percent of the Site is depositional or shows no substantial change." While this statement may be true, it ignores a couple of key points: 1) Most of the evaluation conducted in the RI/F relied on surface sediment data – surface sediment data that indicates elevated levels of contamination at various locations despite the fact the many of the released took place decades ago; and 2) Key sediment source areas in areas that are non-depositional either due to hydrologic or anthropogenic factors – e.g., the zoned of contamination between RM 5 and 7 and the area of contamination in the vicinity of RM 11E. While MNR may be effective in some areas of the site, it is unlikely to be effective at	Blischke, CDM Smith

					certain key sediment source areas. This is acknowledged in on Page 8-27 of the draft FS: "MNR may provide low to high level of risk-reduction depending on processes being relied upon and Site-specific characteristics that might enhance the long-term isolation or destruction of contaminants." All other technologies evaluated in the draft FS are expected to have a moderate to high degree of risk reduction. That said, many of the empirical lines of evidence presented on Page 8-13 demonstrate that conditions conducive to MNR do exist at the site and that MNR will be a significant component of any remedy selected for the Portland Harbor site.	
	Dredging/Removal	8.2.2.4	8-15		Increases in fish tissue concentrations are temporary (see Fox River and Hudson River results, which saw elevated concentrations for one year and then an improvement). These should not be cited as a reason not to dredge.	Neely, NOAA
	Long-Term Effectiveness and Permanence	8.2.4	8-21		The evaluation of long-term effectiveness and permanence should consider the uncertainty in long-term projections of risk reduction and consider the effect of increased short term risk reduction (e.g., T=0) on the uncertainty in the long-term predictions.	Blischke, CDM Smith
	Long-Term Effectiveness – Dredging/Removal	8.2.4.2.4	8-29		The discussion of the effectiveness of dredging in the draft FS Reports states: "With respect to the magnitude of residual risk, environmental dredging/removal may provide moderate to high level of risk reduction and low to moderate residual risk, depending on the effectiveness of dredging and use of backfill material. With respect to the adequacy and reliability of controls for residual risk, this technology may provide high control due to removal of contaminants, if residual contamination is below cleanup levels or addressed through post-dredge covers or capping (if needed)." Clearly, dredging can be effective with the use of post-dredge covers or capping; overall, the draft FS downplays the effectiveness of dredging technologies.	Blischke, CDM Smith
	Short-Term Effectiveness – MNR	8.2.6.1	8-32		Section, page: Please check the arithmetic for worker injuries since the number of hours is stated once as two hundred thousand and once as two hundred million. Two hundred million worker hours does not seem plausible and is presumably a typographical error. Also please explain how the number of work hours is derived (what assumptions were made about the number of personnel, etc.). Given the assumptions in section 7.5 (working 105 days per year during the fish window, 12 hours/day, 6 days/wk), 200,000 worker hours per year implies about 160 construction workers all working overtime (or the equivalent of 286 fulltime workers). Is that what is envisioned?	Neely, NOAA
	Short-Term Effectiveness – Dredging/Removal	8.2.6.2.4	8-34	Table 6.2-11	The evaluation presented in Table 6.2-11 only considers "silt curtains or similar technologies" as acknowledged in the draft FS Report. The draft FS Report downplays the effectiveness of sheet pile enclosures that utilize controls such as the application of sealants to retain dissolved phase contaminants and the use of erosion control devices along the base of the sheet pile structure.	Blischke, CDM Smith
	Overall Protection of Human Health – Alternative A	8.3.1	8-37	Figure 8.2.2-1	The discussion of the time to achieve RAOs for alternative A should be described explicitly. It should be noted that, as documented on Figure 8.2.2-1, that the RG for PCBs of 30 ug/kg is not achieved for either the base case or lower bound scenario.	Blischke, CDM Smith
	Alternative B – Overall Protection of Human Health and the Environment	8.4.1	8-42		The discussion states that Alternatives B-i and B-r are both projected to achieve long-term PCB smallmouth bass whole body tissue contaminant concentrations that are at or below the most conservative estimates of acceptable risk levels. However, the discussion does not acknowledge the uncertainty in these projections.	Blischke, CDM Smith
	Alternative F – Short Term Effectiveness	8.8.5	8-74		The Draft FS Report states: "Dredging-related resuspension and unavoidable releases to the water column are projected to result in short-term exceedances of these criteria over small areas and periods." Even for Alternative F, the releases are expected to be over "small areas and time periods." As a result, discounting removal technologies in the overall evaluation does not seem warranted.	Blischke, CDM Smith
	Comparative Analysis of Risk	9.0	9-1, 9-5		The information presented in Section 9 does not provide a sufficiently detailed comparative risk analysis to support remedial decision making. This is a major shortcoming that permeates the FS. For example, detailed information is presented in Section 6 regarding the expected effectiveness of remedial technologies based on site specific information. However,	Blischke, CDM Smith

					the information presented in Section 7 does note described how that analysis is applied within the various AOPCs to develop the remedial action alternatives. Similarly, a lot of information is presented in Section 8 about the tools for performing the detailed evaluation of alternatives but the comparative analysis of alternatives fails perform this analysis in sufficient detail. For example, the discussion of the Tissue RAO in Section 9.1.2 states: "All of the action alternatives are projected to attain tissue RAOs 2 and 6" and "Dredging actions included in all of the action alternatives are projected to result in elevated tissue PCB concentrations during and immediately following dredging operations due to unavoidable dissolved PCB releases to the water column" Given that all alternatives achieve the RAO and that all short term impacts are expected to be over small areas and time periods, the comparative analysis of alternatives comes down to cost and certainty in achieving the RAO over some time period.	
	Summary of Comparative Analysis of Remedial Action Alternatives	9.0	9-1, 9-12	Table 9.0-1	Table 9.0-1 does not provide sufficient detail with which to select a remedial action alternative. Expect for the no-action alternative, much of the information presented (with the exception of cost, area, CO2 emissions, etc) does not change until Alternatives E and F which are expected to have greater construction water quality impacts and an increased potential for habitat restoration integration conflicts. For example, the ability time to RAOs is either yes or uncertain for all alternatives and the time to achieve RAOs is estimated at 0 – 45 years for all alternatives.	Blischke, CDM Smith
	Overall Protection of Human Health and the Environment	9.1	9-2		Under the discussion of overall protection of human health and the environment, the FS Report states that "the alternatives with more removal of sediment via environmental dredging results in unavoidable resuspension, release, and residuals that reduce the overall protection of human health and the environment." The FS further states: "the application of rigid barriers or silt curtains is not expected to appreciably improve the protection of alternatives with more removal." The FS presents a bias against removal based remedies and fails to acknowledge the uncertainty of long-term projections of risk reduction. Tables presented in section 9 highlight this discrepancy by failing to present sediment SWAC and predicted tissue levels at a range of time frames and instead present these estimates projected out 45 years. While it is likely that further reduction of sediment and tissue levels will occur over time, the predictions of such reductions are highly uncertain.	Blischke, CDM Smith
		9.1.1	9-3		"In Swan Island Lagoon, all of the action alternatives are estimated to attain similar long-term surface sediment PCB concentrations in the range of approximately 60 to 110 ppb." Does this include the proposed CDF or CAD cell in Swan Island Lagoon?	Neely, NOAA
	Summary of Comparative Evaluation Relative to RAOs	9.1.5	9-6		Regarding overall protection, the draft FS states "The primary differences in overall protectiveness achieved by the comprehensive alternatives are related to the extent and duration of shorter term changes in risks that occur during remedy implementation. Those comprehensive alternatives that include greater dredging volumes and/or longer construction durations (especially Alternatives E-r and F-r) provide less overall protection of human health and the environment than shorter duration alternatives that focus on in situ treatment and/or containment." This analysis does not take into account the statement that the areas and time periods for releases are expected to be small, the uncertainty in the long-term projections and the degree to which removing or capping larger areas or volumes of contamination will reduce the uncertainty in the long term projections.	Blischke, CDM Smith
	Long-Term Effectiveness and Permanence	9.3	9-13		Section 9.3 presents the results of the comparative analysis of alternatives. However, the results of the analysis concludes that the various alternatives evaluated are similar for key evaluation factors including: • Reductions in sediment levels (similar); • Reduction in tissue levels (similar); • Minimization of long-term surface water concentrations (similar); • Minimization of potential long term sediment recontamination (projected increases are lower than current COC concentrations and no areas exceed the EPA point estimate	Blischke, CDM Smith

					RG); • Minimization of potential long groundwater impacts (no difference); • Minimization of potential downstream transport (relatively similar); As a result, factors such as the adequacy of controls (which takes into account the amount of material left in place) and reductions in toxicity, mobility and volume through treatment take on greater significance. Other factors evaluated in the comparative analysis generally increase with the amount of material being remediated (e.g., greenhouse gas emissions, duration, complexity and cost). It should be noted that many of the items with similar outcomes were evaluated using the contaminant fate and transport model. Results based on relatively large scale projections from the contaminant fate and transport model may be uncertain and although the range of uncertainty may be similar across the alternatives, EPA should perform additional analysis to understand small scale differences long term projections to properly evaluate long-term effectiveness and permanence.	
	Magnitude of Residual Risk	9.3.1	9-14		Alternatives that permanently remove or isolate more contamination should receive a higher score than alternatives that are projected to reduce contaminant levels through uncertain natural recovery processes that are estimated using contaminant fate and transport models.	Blischke, CDM Smith
	Time to Achieve Protection	9.5.5	9-30	Table 9.5.5-1	Regarding the time to achieve projection, the draft FS Report states: "Based on this summary presented in Table 9.5.5-1, there is little difference in the estimated time to achieve RAOs between Alternatives B through F when the entire range of outcomes is considered." However, a review of Table 9.5.5-1 suggests that there is significant variability between segments, contaminants and range of modeling uncertainties. For example, in Segment 2, using the upper bound projection, the shortest time to achieve protection is for alternative Fi. However, for Segment 3, again using the upper bound projection, the shortest time to achieve protection is alternative Fr. Given the uncertainties, additional analysis of the time to achieve protection is required – preferably on an SMA basis.	Blischke, CDM Smith
	Potential impacts to Workers	9.5.7	9-32		This analysis is flawed in that if the workers were not working on the remediation of the Portland Harbor site, they would be working on remedial or construction work elsewhere with presumably similar impacts to workers. As a result, the results of this analysis should not be factored into remedial decision making.	Blischke, CDM Smith
	Risk Management Principles and Guidance	10.1	10-7		The draft FS Report includes the following statements from the NRC Report on Dredging Effectiveness: *"At the largest sites, the time frames and scales are in many ways unprecedented. Given that remedies are estimated to take years or decades to implement and even longer to achieve cleanup goals, there is the potential— indeed almost a certainty—that there will be a need for changes, whether in response to new knowledge about site conditions, to changes in site conditions from extreme storms or flooding, or to advances in technology (such as improved dredge or cap design or in situ treatments). Regulators and others will need to adapt continually to evolving conditions and environmental responses that cannot be foreseen.* *These possibilities reiterate the importance of phased, adaptive approaches for sediment management at megasites. As described previously, adaptive management does not postpone action, but rather supports action in the face of limited scientific knowledge and the complexities and unpredictable behavior of large ecosystems."* It is clear that given the size and complexity of the Portland Harbor site, EPA will need to rely on a phase, adaptive management approach to implement a protective and cost effective remedy that meets the requirements of the NCP. EPA should begin identifying the elements of this adaptive management approach as it begins to develop the Proposed Plan for the Portland	Blischke, CDM Smith

					Harbor Superfund Site.	
	Risk Management Decisions and Uncertainties	10.2	10-8		The draft FS Report identifies a number of factors related to risk management that are presented in the report: • Development of RGs that represent attainment of risk-based RAOs and provide a balance of effectiveness and achievability (Section 3) • Development of RALs that may achieve the RGs and RAOs in a reasonable timeframe across the Site (Section 4) • Methods to apply RALs to define SMAs for active remediation that reflect the reasonable potential to achieve RAOs (Section 5) • Evaluation of a combination of remedial technologies considering the NCP objectives of achieving the most effective, efficient, and cost-effective long-term protection while minimizing short-term impacts (Sections 6 and 7) • Description and evaluation of the characteristics and performance of the alternatives (Sections 7 through 9), culminating in remedy selection by EPA. Although EPA may disagree with some of the conclusions, the draft FS Report provides the majority of the risk management information necessary risk management to support remedial decision making at the Portland Harbor site. Supplemental analysis focused on the effectiveness of controls to minimize impacts during dredging, refining the long term projections of risk reduction and assessing the adequacy of controls for material left in place at the site should be performed to develop an evaluation that better balances long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness and cost consistent with the NCP. Regarding cost effectiveness, the NCP states: *"Each remedial action selected shall be cost-effective, provided that it first satisfies the threshold criteria set forth in § 300.430(f)(1)(ii)(A) and (B). Cost-effectiveness is determined by evaluating the following three of the five balancing criteria noted in § 300.430(f)(1)(i)(B) to determine overall effectiveness: long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective. A remedy shall be cost effective if its costs are proportional to its overall effectiveness."* By performing the additional analysis to properly balance overall effectiveness and cost, EPA will have the necessary information to select a protective and cost effective remedy that meets the requirements of the NCP.	Blischke, CDM Smith
	Overall Protection of Human Health and the Environment	10.3.1	10-13		"Because of regional background conditions, fish consumption advisories for resident species are expected to remain in effect at the Site irrespective of which alternative is selected." Fish consumption advisories are a de facto injury to natural resources under CERCLA, so some primary restoration should be conducted with the aim of contributing to the removal of these advisories.	Neely, NOAA
	Summary of ComparativeAnalysis of Alternatives	10.3		Figure 10.3-1	It is not accurate to call an area "remediated" if what was done there was to build a CAD or CDF. These structures reduce exposure risk, but they also preclude future uses of natural resources.	Neely, NOAA
	Appendix A		2		Upper Confidence Limits (UCLs) and Upper Prediction Limits (UPLs): Typically we use the UCL to provide conservatism in comparing the UCL on the mean of site samples to an established threshold value. Using the UCL to set the threshold value will bias the threshold value high. If it is used to set the background level, then one would have to use the UCL of onsite data to provide a fair comparison. This begs the question of how to group the onsite samples for	Neely, NOAA

					computing the UCL(s): By river mile? Over a range of samples such that the variance is comparable to the variance in the background data? It is not clear how this would be done.	
	Appendix A		5		Preliminary remediation goals below background will "likely not be used for remedial decisions". This depends how background is defined and should take into account the PCB deposit just upstream of the Site. That deposit should not be used to artificially inflate "background".	Neely, NOAA
	Appendix E	4.7	29		Add explanation of the derivation of the UPL: "EPA's chosen statistic of 17" ppb.	Neely, NOAA
	Appendix Ha	4.1.2.3	65		Sensitivity analysis found that the model was not very sensitive to the magnitude of National Pollutant Discharge Elimination System (NPDES) loadings, with exceptions in the immediate vicinity of the discharge locations. Thus in most cases the model predictions can be used, but if MNR is proposed at or near NPDES discharge for copper or BaP, then the use of this sensitivity run must be evaluated. (This applies to section 6.2.2.1.3 evaluating the likelihood of success of MNR.)	Neely, NOAA
	Appendix K – Cost Estimate	2.1.1 Direct Constructio n Tasks			Mobe De-Mobe costs seem a little high. I would expect to see them between 8-10% however each contractor builds these costs up differently so I would need to see a breakout to know what was included	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.1.1 Indirect Constructio n Tasks			Engineering costs seem a little high. I would expect to see them no more than 10% for this type of project	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.1.1 Indirect Constructio n Tasks			Daily Responsible Party Oversight and PM. This seems high to me. I would expect to see a PM, and project engineer/site inspector and some admin support.	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.1.1 Indirect Constructio n Tasks			Engineering During Construction. $ 78,000 seems high. Does this represent three or four engineers for the month full time?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.1.1 Indirect Constructio n Tasks			Daily Agency Oversight seems high. I am unable to determine what is included in the monthly unit rate	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.1.1 Indirect Constructio n Tasks			I don't know what the level of design is but assume it is conceptual. For that it is our policy to carry a 25 - 30 % contingency. 40 % seems high.	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.1.1 Indirect Constructio n Tasks			I am unable tell what the cost of indirects are for Insurance, bond, Insurance, fee, labor overheads, G&A. 5% would be low for environmental bonding, special insurance, GL. I don't see any subcontractor markup or bonding.	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.1.2 Specific Cost Elements - Table 3		Table 3	I need to see a build up of labor, equipment, material, and other costs to verify unit costs. With that said the unit costs seem reasonable and generally within an acceptable range	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.2 Quantity Estimates			The method used for quantity estimating seems accurate and defensible. When spot checking I come up with similar numbers	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.2 Quantity Estimates			Is there some accounting for the reduced weight of the material for transportation and disposal due to the water draining form the material?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.2 Quantity Estimates			Is there some adjustment for the percent of loss or overages of capping material due to currents?	Sanders, CDM Smith
	Appendix K – Cost	2.3.3			The production rates for capping are reasonable and consistent with industry standard.	Sanders, CDM Smith

	Estimate	Capping				
	Appendix K – Cost Estimate	2.3.5 Full Removal			What type of clamshell will be used. Will an environmental bucket be used?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.5 Full Removal			What method will be used for controlling excavation quantities and grade	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.5 Full Removal			Where are the costs for constructing an offloading cell?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.5 Full Removal			How will the water be managed and where are the costs?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.5 Full Removal			How will the material be transported from the offloading cell to the load out facility?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.5 Full Removal			Are there premium costs included for working at night?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.5 Full Removal			Is there any land based removal included?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.5 Full Removal			Are there costs included for pre & post surveying work?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			Are the costs included to construct the disposal facility?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			How will the water be managed for the material that is draining? Are costs included?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			Is the cost for the 20 acre facility lease included?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			Are the costs for covering and uncovering the stockpiles included?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			How many railcars are anticipated? Are the costs for the mobilization of the cars included?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			Are costs for additional track or siding included to stage rail cars?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			How will the water be managed for the material that is draining? Are costs included?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			Are costs included for the lining of the rail cars?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			What are the costs for mixing in the DE and the costs of the DE	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			Often the disposal facility has trouble getting the rail cars dumped out and an empty train back. Is there any standby time for the load out crews included?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			Typically the disposal facility will only allow what they call unit trains or a number of cars with the same material to be loaded at one time. will there be room for two full unit trains on site to avoid running out of stockpile room?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			Material will need to be stockpiled and sampled for profiling at the disposal facility. Are these samples and sampling costs included?	Sanders, CDM Smith
	Appendix K – Cost Estimate	2.3.7 Disposal			Where are the costs for water treatment, NPDES permit, and TESC establishment and maintenance?	Sanders, CDM Smith
	Appendix K – Cost Estimate	4.4.1 Sheet pile Walls			The unit of LF is non-standard for calculating costs. SF would be easier to evaluate	Sanders, CDM Smith
	Appendix K – Cost Estimate	4.4.1 Sheet pile Walls			Will in water acoustical surveying and monitoring be required for driving sheet pile? If so are the costs included?	Sanders, CDM Smith
	Appendix K – Cost Estimate	4.4.2 Silt Curtain			Is maintenance included in the costs? Will bubble curtains be necessary? If so are costs included?	Sanders, CDM Smith
	Appendix K – Cost			Table 2	There seems to be some possible rounding errors in the spreadsheet. It may be advisable as	Sanders, CDM Smith

	Estimate			Discount Costs	the factors are in millions to include a decimal so it is possible to distinguish between the Non-discount and the discount after the factors are applied.	
	Appendix K – Cost Estimate			Table 2 Long term MMO net present value	I am unable to understand why some areas present a range and other areas do not	Sanders, CDM Smith
	Appendix La	2.3.2.3	17		Equation 2-29 gives the erosion rate based on shear stress. How does Equation 2-30 relate (i.e. when do we use it)?	Neely, NOAA
	Appendix La	2.3.2.3	17		Refers to Figure 2-17. Particle diameters in text do not match those shown in figure.	Neely, NOAA
	Appendix La	2.3.4	35		Erodibility parameters are averaged over the whole Site for cohesive bed areas. Therefore, in the places with above average erodibility (i.e. in about half the cores, and in areas of the river with similar bed characteristics to these cores), the model will erroneously predict no erosion at some times. Table 2-6 shows that the critical shear stress ranges from 0.09 to 0.73 with an average value of 0.30.	Neely, NOAA
	Appendix La			Table 2-13	Why would we omit 2002-03 data rather than averaging it in with the other data? It is likely that we may have similar "anomalous" periods in the future.	Neely, NOAA
	Appendix La			Figure 2-75	The method of calculating the statistics of the absolute difference in net sedimentation rate is not appropriate. Using this method, over-predictions and under-predictions cancel out so it cannot show how accurate the model predictions were, only whether they had an overall bias. Instead, after step 1, generate a third data set which is the absolute value of the difference between the predicted and measured value in each zone. Then take the mean of that data set. That will estimate how well the model matches the measured sedimentation on a given spatial scale.	Neely, NOAA
	Appendix La	2.3.6	41		"The first step in this evaluation was determining qualitative agreement between erosion and deposition areas (e.g., if the model predicts net deposition in a specific grid cell, is the prediction consistent with the data-based bed elevation change?)." Table 2-15 suggests that 2.5 cm/yr was used as the criterion for "qualitative agreement". This is a large margin given that the criterion in Section 6.2 for categorizing an area as "likely to recover" (Category 3) was >1 cm/yr of sedimentation. If the model accuracy is ~2.5 cm/yr, then an area classified as Category 3 may actually be experiencing net erosion of 1.5 cm/yr. This is the main problem with the sediment modeling. The approach is acceptable, and the accuracy may be as good as any model could possibly be, given uncertainty on all the inputs and measurements, but it's overly optimistic to use it to try to give a sedimentation rate to within 1 cm/yr.	Neely, NOAA
	Appendix La			Figure 2-79	This figure should be corrected to match the text on page 46 or else vice versa. The runs listed in the text (7, 11, 12, 26) are not the ones shown here (7, 9, 12, 26).	Neely, NOAA